

# CLAIMS

1. An encoding apparatus, comprising:  
a uniformly random number generating portion  
for generating uniformly random numbers; and  
an encoding portion for encoding each pixel  
value of an original picture signal based on a compared  
result of at least one threshold value that is set  
based on the uniformly random numbers and a pixel value  
of the original picture signal.

2. The encoding apparatus as set forth in claim  
1,  
wherein said encoding portion encodes each  
pixel value of the original picture signal a plurality  
of times, and

wherein said uniformly random number  
generating portion generates a different uniformly  
random number for encoding each pixel value of the  
original picture signal a plurality of times.

3. The encoding apparatus as set forth in claim  
1,  
wherein said encoding portion repeatedly  
encodes each of all pixel values in a predetermined  
range of the original picture signal, one pixel value  
at a time.

4. The encoding apparatus as set forth in claim  
3,  
wherein the predetermined range is one frame

of the original picture signal.

5. The encoding apparatus as set forth in claim 2,

wherein said encoding portion successively executes a process for successively encoding each pixel value in a predetermined range of the original picture signal a plurality of times.

6. The encoding apparatus as set forth in claim 5,

wherein the predetermined range is one frame of the original picture signal.

7. The encoding apparatus as set forth in claim 1,

wherein said encoding apparatus executes binarization of each pixel value of the original picture signal based on the threshold value.

8. The encoding apparatus as set forth in claim 1

wherein the threshold value is a value in a gradation range of the original picture signal.

9. The encoding apparatus as set forth in claim 1,

wherein said at least one threshold value is a fixed number of values that depend on a predetermined original picture signal.

10. The encoding apparatus as set forth in claim 1,

wherein the original picture signal is a digital picture signal.

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11. A decoding apparatus for decoding an original picture signal from an encoded picture signal of which each pixel value of an original picture signal is encoded based on a compared result of a threshold value that is set based on a uniformly random number and a pixel value of the original picture signal, the encoded picture signal having an encoded value for each pixel value, comprising:

10  
a cumulating portion for cumulating the encoded values of the encoded picture signal for each pixel value of the original picture signal; and

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a decoding portion for decoding the encoded values cumulated by said cumulating portion for each pixel value of the original picture signal based on the number of times counted by a counting portion.

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12. The decoding apparatus as set forth in claim 11, further comprising:

a sampling portion for sampling the encoded values of the encoded picture signal,

wherein said cumulating portion cumulates the encoded values sampled by said sampling portion.

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13. The decoding apparatus as set forth in claim 12,

wherein said sampling portion variably sets a sampling period for which the encoded values are

sampled.

14. The decoding apparatus as set forth in claim 11, further comprising:

5 a controlling portion for causing said cumulating portion to stop cumulating the encoded values.

15. The decoding apparatus as set forth in claim 14,

10 wherein said controlling portion causes said cumulating portion to stop cumulating the encoded values based on command information that is input by the user.

16. The decoding apparatus as set forth in claim 14,

15 wherein said controlling portion causes said cumulating portion to stop cumulating the encoded values when the picture quality of the original picture signal decoded from the encoded values exceeds a predetermined reference value.

20 17. The decoding apparatus as set forth in claim 16,

25 wherein said controlling portion determines that the picture quality exceeds the predetermined reference value when the counting portion has counted the predetermined number of times that said cumulating portion has cumulated each pixel of the original picture signal.

18. The decoding apparatus as set forth in claim 11,

wherein said decoding portion decodes the original picture signal based on a predetermined gradation value that represent the number of gradation levels.

19. The decoding apparatus as set forth in claim 11,

wherein the gradation value is variable.

20. The decoding apparatus as set forth in claim 11,

wherein the original picture signal is a digital picture signal.

21. The decoding apparatus as set forth in claim 11,

wherein the encoded values are binary values.

22. An encoding method, comprising the steps of: generating uniformly random numbers; and encoding each pixel value of an original

picture signal based on a compared result of at least one threshold value that is set based on the uniformly random numbers and a pixel value of the original picture signal.

23. A decoding method for decoding an original picture signal from an encoded picture signal of which each pixel value of an original picture signal is encoded based on a compared result of a threshold value

that is set based on a uniformly random number and a pixel value of the original picture signal, the encoded picture signal having an encoded value for each pixel value, comprising the steps of:

5  
cumulating the encoded values of the encoded picture signal for each pixel value of the original picture signal;

counting the number of times cumulated at the cumulating step; and

10  
decoding the encoded values cumulated at the cumulating step for each pixel value of the original picture signal based on the number of times counted at the counting step.

24. A record medium from which a computer reads a program that causes the computer to perform the steps of:

15  
generating uniformly random numbers; and

20  
encoding each pixel value of an original picture signal based on a compared result of at least one threshold value that is set based on the uniformly random numbers and a pixel value of the original picture signal.

25. A record medium from which a computer reads a program that causes the computer to decode an original picture signal from an encoded picture signal of which each pixel value of an original picture signal is encoded based on a compared result of a threshold value

that is set based on a uniformly random number and a pixel value of the original picture signal, the encoded picture signal having an encoded value for each pixel value, the program comprising the steps of:

5                   cumulating the encoded values of the encoded picture signal for each pixel value of the original picture signal;

                  counting the number of times cumulated at the cumulating step; and

10                   decoding the encoded values cumulated by said cumulating portion for each pixel value of the original picture signal based on the number of times counted at the counting step.

26.               An encoding apparatus, comprising:

15                   a uniformly random number generating portion for generating uniformly random numbers; and

                  an encoding portion for encoding an original signal based on a compared result of at least one threshold value that is set based on the uniformly random numbers and each signal value of the original signal.

20                   27.               The encoding apparatus as set forth in claim 26,

                  wherein each signal value of the original signal is encoded a plurality of times, and

25                   wherein said uniformly random number generating portion generates a different uniformly

random number for encoding each signal value of the original signal a plurality of times.

28. The encoding apparatus as set forth in claim 26,

5 wherein said encoding portion repeatedly encodes each of all signal values in a predetermined range of the original signal, one signal value at a time.

29. A decoding apparatus for decoding an original signal from an encoded signal of which each signal value of an original signal is encoded based on a compared result of a threshold value that is set based on a uniformly random number and a signal value of the original signal, the encoded signal having an encoded value for each signal value, comprising:

10 a cumulating portion for cumulating the encoded values of the encoded signal for each signal value of the original signal;

15 a counting portion for counting the number of times cumulated; and

20 a decoding portion for decoding the encoded values cumulated by said cumulating portion for each signal value of the original signal based on the number of times counted by said counting portion.

25 30. An encoding method, comprising the steps of: generating uniformly random numbers; and encoding each signal value of an original



signal based on a compared result of at least one threshold value that is set based on the uniformly random numbers and each signal value that is an information unit of the original signal.

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31. A decoding method for decoding an original signal from an encoded signal of which each signal value of an original signal is encoded based on a compared result of a threshold value that is set based on a uniformly random number and a signal value of the original signal, the encoded signal having an encoded value for each signal value, comprising the steps of:

10  
cumulating the encoded values of the encoded signal for each signal value of the original signal;

counting the number of times cumulated; and

15  
decoding the encoded values cumulated at the cumulating step for each signal value of the original signal based on the number of times counted at the counting step.

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32. A record medium from which a computer reads a program that causes the computer to perform the steps of:

generating uniformly random numbers; and

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encoding each signal value of an original signal based on a compared result of at least one threshold value that is set based on the uniformly random numbers and each signal value of the original signal.

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33. A record medium from which a computer reads a program that causes the computer to decode an original signal from an encoded signal of which each signal value of an original signal is encoded based on a compared result of a threshold value that is set based on a uniformly random number and a signal value of the original signal, the encoded signal having an encoded value for each signal value, the program comprising the steps of:

10 cumulating the encoded values of the encoded signal for each signal value of the original signal;

counting the number of times cumulated; and

15 decoding the encoded values cumulated at the cumulating step for each signal value of the original signal based on the number of times counted at the counting step.

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